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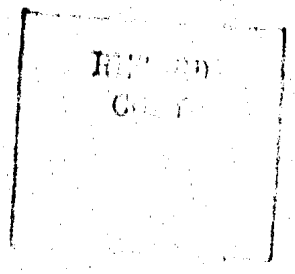

INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION - 1960

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION--

SOVIET BLOC ACTIVITIES

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ROCKETS AND ARTIFICIAL EARTH SATELLITES

Abstracts from Issues No. 4 and No. 5 of "Iskusstvennyye Sputniki Zemli"

Issues No. 4 and No. 5 of the famed Russian publication "Iskusstvennyye Sputniki Zemli" (Artificial Earth Satellites) are now available in this country. Issue No. 4 contains 15 articles and Issue No. 5 contains 10 articles. Brief abstracts are provided below.

Issue 4:

1. "Motion of an Artificial Satellite in the Normal Gravitational Field of the Earth," by M. D. Kislik, pp. 3-17.

This article examines the problem of the motion of an artificial satellite in a normal gravitational field of the Earth without consideration of the influence of air resistance and anomalies in the force of gravity. The results can be used when computing the orbits of satellites and also for a qualitative analysis of the influence of the Earth's compression on the motion of satellites.

2. "Determination of the Density of the Upper Atmosphere on the Basis of the Results of Observations of the Flight of the Third Soviet Artificial Earth Satellite," by P. Ye. El'yasberg and V. D. Yastrebov, pp. 18-30.

This article is devoted to an exposition of the results of the determination of the density of the upper atmosphere based on data of the most precise measurements of the orbital elements of the third artificial earth satellite in the course of its first period of existence.

3. "Variations in the Density of the Upper Atmosphere Based on Data Concerning Changes in the Periods of Revolution of Artificial Earth Satellites," by G. A. Kolegov, pp. 31-34.

Observations of artificial earth satellites have shown that the rate of decrease in the periods of revolution as a result of braking in the upper atmosphere does not increase monotonously as the satellite descends but experiences notable variations. Because this decrease is due to the density of the upper atmosphere it is possible for us to judge variations in density from variations in the rate of decrease. This article gives the results of processing experimental data based on observations of Soviet artificial earth satellites. It also gives some interpretations of the results.

4. "Determination of Conditions of Illumination and the Time an Artificial Earth Satellite is Present in the Shadow and in the Sun," by I. M. Yatsunskiy, pp. 35-42.

This article sets forth one of the possible methods for determination of the conditions of illumination of a satellite and provides a brief analysis of the motion of the 1st, 2d and 3rd Soviet satellites in relation to the Earth's shadow.

5. "Determination of the Orbital Parameters of the Artificial Satellite Based on Data from Terrestrial Measurements," by T. M. Eneyev, A. K. Platonov, and R. K. Kazakova, pp. 43-55.

This article briefly sets forth a method for determination of orbital elements of a satellite and prediction of its motion on the basis of processing of data collected by optical and radiotechnical observations.

6. "Methods for the Numerical Solution of Equations in Finite Differences and Their Application to Computations of the Orbits of Artificial Earth Satellites," by G. P. Taratynova, pp. 56-81.

This lengthy paper presents a numerical solution of equations in finite differences and their application to computations of the orbits of artificial earth satellites. The need for developing such methods arose during the solution of certain problems in celestial mechanics in which it was necessary to derive the solution of a system of nonlinear differential equations describing motion for large intervals of time. Such problems are discussed as the problem of determination of the lifetime of an artificial satellite, determination of the evolution of the satellite orbit during its lifetime and the long-range prediction of the satellite orbit, etc.

7. "Equations for Perturbed Motion in Kepler's Problem," by A. I. Lur'ye, pp. 82-85.

This brief communication is based on a direct application of the method of variation of arbitrary constants in dealing with equations of perturbed motion of a planet.

8. "Elements in the Theory of Impact of Solid Bodies with Great (Cosmic) Velocities," by K. P. Stanyukovich, pp. 86-117.

Stanyukovich's article examines the problem of the impact of meteorites with cosmic velocities against the surface of a planet. This problem is also pertinent to the study of the impact of micrometeorites against the surfaces of artificial earth satellites and cosmic rockets.

9. "Meteoric Matter and Some Problems of Geophysics of the High Layers of the Atmosphere," by B. A. Mirtov, pp. 118-134.

This article makes an attempt to correlate certain phenomena arising in the upper atmosphere with the presence there of rapidly moving particles of meteoric origin. The role of meteoric matter in the upper layers of the atmosphere has been studied very inadequately. This article therefore discusses the problem under two headings (1) meteoric matter and the scattering of light in the upper atmosphere and (2) meteoric matter and night glow.

10. "Magnetometric Apparatus on the Third Soviet Artificial Earth Satellite," by S. Sh. Dolginov, L. N. Zhuzgov and V. A. Selyutin, pp. 135-160.

This article is perhaps the most definitive paper on the subject of satellite magnetometric apparatus ever to appear in Soviet literature. This superbly illustrated article describes the apparatus in great detail; many diagrams are provided.

11. "Method of Determination of the Electrical Potential of Bodies Situated in Plasma," by Ya. M. Shvarts, pp. 161-164.

This article describes a method of determination of the electrical potential of satellites and rockets. This method is applicable to the determination of the potential of any body situated in plasma.

12. "Investigation of Meteoric Particles on the Third Soviet Artificial Earth Satellite," by T. N. Nazarova, pp. 165-170.

This article provides a method for deriving information concerning very small meteoric particles. This method involves the use of the integral characteristics of meteoric matter derived from the observation of zodiacal light and by having recourse to extrapolation. Table 1, drawn up on the basis of photometric research, shows the highly variable values for spatial density of dust-like meteoric matter in the vicinity of the Earth's orbit.

13. "Some Results of the Measurement of the Mass Spectrum of Positive Ions on the Third Soviet Artificial Earth Satellite," by V. G. Istomin, pp. 171-183.

This article gives the results of measurements made by the radio frequency mass spectrometer installed on the third Soviet satellite. It recorded positive ions with mass numbers 32, 30, 28, 18, 16 and 14. These were identified with charged ions of molecular oxygen, nitric oxide, molecular nitrogen, atomic oxygen and atomic nitrogen. Data were received from a range of elevations between 225 and 980 km and in a range of latitudes between 27°N. and 65°N. A definite pattern was discovered in the change of composition of the ionosphere with height and latitudes.

14. "Measurement of Cosmic Rays on Geophysical Rockets," by Yu. G. Shafer and A. V. Yarygin, pp. 184-194.

This article gives the results of research conducted in 1958 to determine the global intensity of cosmic rays by using Geiger counters and an ionization chamber installed aboard a geophysical rocket. The instrument is described textually and diagrammetrically.

15. "The Artificial Comet as a Method of Optical Observations of Cosmic Rockets," by I. S. Shklovskiy, pp. 195-204.

Shklovskiy's well illustrated article describes the use of an artificial comet for the purpose of enhancing the possibilities of making optical observations of cosmic rockets.

Issue 5:

1. "Orbits of Cosmic Rockets in the Direction of the Moon," by L. I. Sedov, pp. 3-15.

This well illustrated article represents the text of a speech made at the annual meeting of the American Rocket Society in November 1959.

2. "Magnetic Measurements on the Second Cosmic Rocket," by S. Sh. Dolginov, Ye. G. Yeroshenko, L. N. Zhuzgov, N. V. Pushkov and L. O. Tyurmina, pp. 16-23.

This paper presents results of measurements of both the Earth's magnetic field and that of the Moon (none was found to exist).

3. "Measurements of Radiation During the Flight of the Second Cosmic Rocket," by S. N. Vernov, A. Ye. Chudakov, P. V. Vakulov, Yu. I. Logachev and A. G. Nikolayev, pp. 24-29.

This presentation reports on the investigation of radiation as recorded by apparatus installed on the second cosmic rocket. The instruments used are listed and described. Data are supplied relative to the Earth's outer radiation belt, cosmic radiation between the Earth and Moon, and measurements made to detect the possible existence of a lunar radiation belt.

4. "Investigation of Cosmic Rays During the Flight of the Second Cosmic Rocket to the Moon," by L. V. Kurnosova, V. I. Logachev, L. A. Razorenov and M. I. Fradkin, pp. 30-37.

This article describes the instruments carried aboard the cosmic rocket to measure the intensity of cosmic rays. An important part of the article deals with the nuclear component.

5. "Results of Investigation of Meteoric Matter with Instruments Installed Aboard Cosmic Rockets," by T. N. Nazarova, pp. 38-40.

Comparison of the results received from measurements made aboard the third satellite and three cosmic rockets show that the density of meteoric matter in the vicinity of the Earth is not constant. It changes in time and space.

6. "Some Problems of Control in Interplanetary Space," by B. V. Raushenbakh and Ye. N. Tokar', pp. 41-53.

This study is devoted to an examination of several problems arising in the control of an interplanetary missile. It represents a rather detailed presentation of certain equations and laws applicable to the solution of this problem.

7. "Determination of Conditions of Visibility of Cosmic Rockets," by O. V. Gurko, pp. 54-59.

The conditions under which cosmic rockets may be observed are discussed in considerable detail. Conditions are favorable for observation when the observation point is situated in the Earth's shadow, the rocket is at a sufficiently great viewing angle, and the object possesses the required brightness. These factors are each treated in separate sections. The formation of an artificial "comet" at the proper moment is one of the methods of enhancing the possibilities of observation.

8. "On the Problem of the Formation of NO^+ in the Upper Atmosphere," by A. D. Danilov, pp. 60-65.

It has been previously demonstrated that an important role in the upper atmosphere is played by the process of overcharging ions of atomic oxygen with molecules of nitrogen, yielding ions of NO^+. The ions forming as a result of this reaction should recombine rather rapidly, dissociating into nitrogen and oxygen. This study makes an attempt to examine these reactions and compare the results of computations with observational data.

9. "Observations for Signals of the Third Soviet Artificial Earth Satellite at Cape Chelyuskin," by L. P. Kuperov, pp. 66-70.

Observations for signals of the third Soviet artificial earth satellite were made at Cape Chelyuskin ($77^{\circ}43'$ N., $104^{\circ}17'$ E.) between 16 May and 6 June 1958 (between the 13th and 296th revolutions) on a frequency of 20005 kc. Observations were made by workers of the Arctic and Antarctic Scientific Research Institute. The article describes the apparatus used in these observations and the results obtained.

10. "Change of Albedo of the First Artificial Earth Satellite as a Result of the Influence of External Factors," by I. M. Yatsunskiy and O. V. Gurko, pp. 71-73.

This article discusses change in albedo and the character of the satellite's reflecting surface as a result of the influence of the atmosphere, meteoric matter and other physical factors.

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